

ABSTRACT OF THE DISCLOSURE

[00083] The present invention is a phase-imaging technique by digital holography that eliminates the problem of 2π -ambiguity. The technique is based on a combination of two or more digital holograms generated using multiple wavelengths. For a two-wavelength experiment, the phase maps of two digital holograms of different wavelengths are subtracted which yields another phase map whose effective wavelength is inversely proportional to the difference of wavelengths. Using two holograms made with a 633 nm HeNe laser and a 532 nm doubled YAG laser an image was obtained that is a 3D reconstruction of a reflective surface with axial resolution of ~10 nm over a range of -5 um, without any phase discontinuity over this range. The method can be extended to three wavelengths or more in order to reduce the effect of phase noise further.